

# Development of a reliable calculation model for deflections in Timber-Concrete composite panels with partial interaction

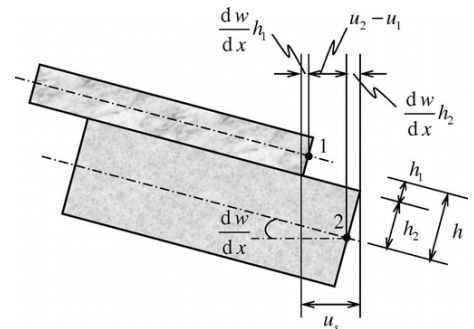
## Background

Structural elements like beams and panels composed of two or more layers are often utilized as a solution for better structural performance in specific cases. Timber as an environmentally-friendly material is being increasingly used in construction. However, it exhibits relatively lower stiffness and of course lower weight compared to other construction material. Composing timber with a top layer of concrete would be offered as a solution to increase the stiffness and also the weight when additional weight is required e.g. for a better acoustic performance in floor panels. However, due to the interlayer relative slip (so-called partial composite (PC) interaction), their deformation level is expected to be higher than a perfect full-composite panel. Nowadays, there exist well formulated models for SLS design in Eurocode 5 (EC5: Design of Timber Structures) for beam elements. But it is still lacking a proprietary model for the panels. A preliminary study has demonstrated inaccuracy of the existing calculation models for panels for the deformations. As the serviceability limit state (SLS for displacement and vibrations) is often the governing design criteria for timber panels, a reliable accurate calculation model for the panel deflections seems essential for an optimal design.



## Objectives

- To develop a special calculation model for deflection prediction in PC panels.
- Investigating the effect of interlayer slip/interaction on SLS performance of timber-concrete panels
- Evaluating inappropriateness/ inaccuracy level of the existing formulation in EC5 for beams, applied to panels.



## Methods

- Mathematical modelling and analytical solutions.
- FE numerical modelling for validation.

## Learning outcomes

This work will be carried out at Division of Structural Engineering Chalmers in collaboration with the department of Mechanics and Maritime Sciences (M2).

The work will give the students a deeper understanding of the structural behavior of composite panels, modeling and simulation, and analysis and optimal design of partial composite panels for floors. The project will give the student beneficial skills and deeper knowledge in structural mechanics for a continued career in structural engineering.

## Contact

For more information about the project, please contact the supervision team:

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